



PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Machines for Applying Color to a Web

I, HARRY FRIEDWALD, a citizen of the United States of America, of 325 East 176th Street, Bronx, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a machine for applying color to a web which is particularly adapted to be used with a cigarette making machine, preferably of the continuous rod type, for coloring the wrappers of such cigarettes.

There is at present a demand among women cigarette smokers for a colored cigarette and some attempts have been made to meet this demand without any noticeable commercial success. Structurally such known forms of colored cigarettes have not been as satisfactory as the usual white wrapper cigarettes.

This has been due at least in part to the fact that the cigarette manufacturers have simply substituted an all colored paper for the usual cigarette paper now in general use with the conventional white wrapper cigarettes. The white cigarette paper now in general use

has been carefully constructed both chemically and physically to meet very exacting requirements. For instance, it must be an extremely thin tissue and yet have a tensile strength to permit it to be

drawn under tension of about sixty pounds through the cigarette making machine without rupturing; it must have a rate of burning equal to that of its contained tobacco filling; it must burn substantially without ash and without odor; and, most important, it must be cheap.

The primary object of the invention is to provide a simple form of attachment for a conventional type of cigarette making machine and this attachment is organized to apply color to the wrapper forming paper web immediately before it is fed to the cigarette making machine

and to color the web in such way as to provide the necessary form of colored area so as to provide the cigarette as above described, and at the same time not to affect the normal and usual operation of the cigarette making machine in any way.

Applying wet coloring material to the thin cigarette paper as herein suggested has the effect of causing the paper to expand but this expansion is not always uniform, and is controlled, at least in part, by numerous variables; for instance, by variations in the basic paper stock, by variations in the fluidity of the color material as it is being applied, and, more particularly, by variations in the rate of drying of the wetted web after it has passed the color applying mechanism on its way to the cigarette forming machine.

It is the usual practice in the operation of cigarette machines of this character to provide cutting or severing means for cutting off the finally formed cigarette rod into commercial cigarette lengths. It is obviously necessary in the form of cigarettes herein featured that the succeeding lines along which the rod is cut must come at exactly prefixed points in the uncolored bands between the colored areas in order to provide the fixed lengths to the uncolored white ends herein featured.

Accordingly, another object of the invention is to provide for an automatic control of the color mechanism so that this mechanism will locate the colored areas on the web in such positions that the severing device will successively cut the rod along accurately located lines across the uncolored bands irrespective of any creeping or lagging of the wetted web between the color applying mechanism and the cigarette forming machine.

In the embodiment of the invention herein disclosed, the dye or other coloring material used is applied to the web in prefixed areas by means of a printer

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roll and this in turn is supplied by means of a squeeze roll somewhat following conventional structure of printing machines. There are, of course, occasions when it is necessary to interrupt the action of the color applying mechanism from time to time. It has been found that after such interruption there was a messy application of color on the portion of the web next passed for a period of time after the operation was resumed.

Another object of the invention is, therefore, to provide for a uniform application of the coloring material even though the operation be interrupted from time to time.

In accordance with the invention there is provided a machine for applying color to a web, comprising mechanism for drawing a length of web along a printing and drying path and for severing the same into preset lengths, a printer provided with printer roll operatively engaging the web while in said path to apply color thereto along spaced apart areas, and means operatively controlled by variations in a prefixed spacing of the adjacent ends of the colored areas relative to said path at the instant of actuation of a severing device for rotatably adjusting the printer roll relative to the web to insure the timing of the severing device to sever the web between succeeding colored areas.

In the drawings:—

Fig. 1 is a perspective view of a preferred embodiment of the colored cigarette aspect of the invention;

Fig. 2 is a plan view of the colored portion of the web as it is being fed into the cigarette making machine;

Fig. 3 is a perspective view of an attachment to a cigarette forming machine, the parts being shown somewhat schematically, for applying color to a white web to form the colored wrappers of Fig. 2;

Fig. 4 is a detailed view in axial section showing a loose driving connection between the printer roll and drive shaft on which it is mounted;

Fig. 5 is a diagrammatic showing of the electrical parts for controlling the reversible motor of Fig. 3; and

Fig. 6 is an explanatory view of a part of the electric eye control.

Referring to the finished cigarette *a* as shown in Fig. 1, it is understood that it is of a commercial length and is provided with a wrapper *b* formed basically of a conventional grade of white cigarette paper. The mid-length portion *c* of the cigarette is of a color contrasting with white (and in the illustrated

embodiment of the invention is intended to be red). At one end of the cigarette is an uncolored band *d* about one-half inch long forming the mouthpiece end of the cigarette and at the opposite end is a narrow uncolored band *e* forming the end of the cigarette to be lit.

The cigarette wrapper *b* is formed from a long, narrow web *f* as shown in Fig. 2 in which the colored areas *g* are longitudinally spaced apart to provide therebetween uncolored areas *h* designed to be severed along cut lines *i* to form on opposite sides thereof the bands *d* and *e* in the finished cigarette. The color areas *g* extend from one long edge *j* of the web almost to the opposite long edge *k* to form an overlapping uncolored cementing strip *l* between the colored area *g* and the adjacent long edge *k*. In forming the cigarette, adhesive is applied along the strip *l* and as the wrapper is turned about the tobacco filling in the cigarette making machine to form the cigarette rod the uncolored marginal strip *l* is located on the inner side of the finished rod leaving the colored side exposed as the continuously colored portions *c* in the finished cigarettes. In this way coloring material may be used which might otherwise affect or be affected by the cementitious or adhesive material used in pasting the cigarette rod.

Referring to Fig. 3, there is disclosed symbolically a cigarette making machine 10 of the continuous or rod type. At the discharge end of the machine and operatively connected to be driven by the mechanism therein, is located a conventional form of propeller blade cutting device 11 designed to cut the cigarette rod *m* into commercial length cigarettes *a*. The color applying mechanism herein disclosed is intended to constitute an attachment to any of the known forms of cigarette making machines and it is the intent to operate the attachment in such way as will have no effect upon the usual operation of such standard machines.

Still following known practices, the web *f* is drawn from a source of supply such as the spool 12 under tension of mechanism forming part of the machine 10. If necessary, the spool 12 may be re-located on the machine so as to provide the necessary space to accommodate the color applying mechanism herein featured, and to provide sufficient space between the color applying device and the cigarette making machine to permit either an air-drying of the web wetted by the applied color, or to permit the installation of a drying chamber or other

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necessary drying apparatus (not shown) between the color applying mechanism and the machine 10 for the purpose of insuring a sufficiently dried condition of the colored web before it is fed to the forming, filling and cementing elements within the machine 10.

The uncolored web is drawn off the spool 12 and is passed first over idler roll 13, then over the horizontal pressure roll 14, idler rolls 15 and 16, past the registry control 17, and then into the cigarette making machine 10.

The color selected for use is applied to the web *f* by means of a printer 18 supplied from a color feeding device 19 and which printer in turn applies the color to the portion of the web passing between the printer roll 20 and the pressure roll 14.

The color feeding device 19 comprises a frame 21 pivotally mounted for rocking movement and includes a color reservoir 22 into which dips a pick-up roll 23. The roll 23 supplies color taken from the reservoir to a squeeze roll 24 which is manually adjustable vertically in slots 25 formed in upstanding arms 26 forming part of the frame 21 and projecting above the reservoir 22. It is understood from this structure that squeeze roll 24 is delicately adjusted vertically to the pick-up roll 23 to control the thickness of the color film transferred to the printer roll 20.

Referring to the printer, there are disclosed in axial alignment three shafts forming a power drive for rotating the printer roll 20. This power drive includes a main shaft 27 driven from the power drive mechanism represented by shaft 90 forming part of the machine 10 so that the main shaft 27 rotates in synchronism with the operative parts of the machine 10 including the cutting device 11 connected to shaft 90 by drive 91. The main shaft is in normal driving engagement with a differential shaft 28 through a main control clutch 29. Differential shaft 28 is connected to a printer shaft 30 through a planetary type differential mechanism 31. This differential mechanism includes bevel pinion 32 on the end of shaft 28 and which pinion acts 50 through the medium of pinions 33 and 34 meshing with pinion 35 on shaft 30 and normally drives shaft 30 in the opposite direction from shaft 28. Pinions 33 and 34 are revolvably mounted on 55 studs 36 and 37 projecting inwardly from a ring gear 38, the latter being normally held against rotation by teeth 39 thereon meshing with worm 40 on the shaft 41 of a reversible type motor 42. From 60 this construction, it is seen that the ro-

tation of the ring gear will alter the position of the printer roll 20 relative to the web *f* and to the cutting device 11 which is beyond the cigarette making machine 10 at the opposite end of the machine.

The printer roll 20 is loose on shaft 30 (see Fig. 4) and is provided at its periphery with two circumferentially spaced apart printing plates 43 and 44 each having a smooth face printing surface of the same dimension and equal to the area of the colored areas *g*. These printing plates are preferably formed of rubber or other approved forms of plate usual for transferring large areas of color to a travelling web. The adjacent ends of the plates are spaced apart a distance to provide the uncolored area *h* between adjacent colored portions of the web. The printer roll is provided with a crown-headed hub 45 and is held from movement in one direction by a stop collar 46 secured to the shaft 30. The hub 45 and the printer roll are driven from the shaft 30 through a crown-headed collar 47 provided with a slot 48 in which extends pin 50 from the shaft. The cam forming serrated edges of the hub and collar 47 are maintained to provide a loose driving connection between the shaft and printer roll by means of a spring 51 bearing at one end on the collar 47 and on its opposite end on a stop 52 secured to the free end of the shaft 30.

By means of this construction, it is possible to readjust the position of the printer relative to the web as herein-after described without the printing plates smearing the web during the periods of readjustment and reengagement. The shaft 30 may be given a slight rotation by the operation of the differential 31 during the instant of time while one of the printing plates is in its printing engagement with the web. As the peripheral speeds of the printing plate and web are equal at this time, the web will tend to hold the plate, and with it the printer roll 20, from either increasing or decreasing its speed for the time being. This means that shaft 30 may be given a slight rotary movement in either direction and which will have the effect of causing the cam teeth on the hub 45 to ride up slightly on the cam teeth on the crown collar 47 without any effect except, of course, to shift the crown collar axially with incidental further compression of the resetting spring 51. However, as the plates 43-44 move to bring the next succeeding recess between their ends opposite the web, the holding effect on the web will be momentarily

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released and this will permit spring 51 to push the crown collar to the right and thus shift the now free printer roll to restore the printer roll rotatively into 5 that adjusted position set by the previously rotatively adjusted printer shaft. In the particular set-up illustrated, a counter clockwise rotation of the ring gear 38 will advance the impressions 10 made by the printing plates while a clockwise rotation of the ring gear will retard them.

The motor 42 is so regulated by the 15 registry control 17 that any creeping of the web between the color applying mechanism and the cigarette making machine will be corrected at the printer so that when the cigarette rod is passed out of its former 10, the cutting mechanism 11 will under all varying conditions 20 operate exactly along the prefixed cut line *i* to insure the formation of the cigarette as shown in Fig. 1 so that every cigarette will be exactly like every other 25 cigarette. This regulation is attained by a photoelectric cell type of electric mechanism for actuating and controlling the direction of rotation of the motor 42. In Fig. 5, the printed web *j* is represented 30 by a line of alternative heavy and light portions corresponding respectively to the colored and uncolored portions of the web and which web is caused to pass through the registry control 35 17. This control includes two photoelectric cells 53 and 54 mounted in housings 55 and 56 located beneath the web, each housing having a rectangular opening 57 and 58 facing the web. Above the 40 web is a lamp 59 with its housing 60 provided with two rectangular openings 61 and 62 located close to the web and directly opposite the openings 57 and 58. The all-over span of the openings 45 corresponds to the distance between adjacent colored portions, that is, to the length of the uncolored area *h*. The photo-electric cells 53 and 54 are connected to magnets 63 and 64 of a double 50 acting relay 65 through commutators 66 and 67. These commutators are driven from the mechanism of the cigarette making machine through a drive connection 92 and are timed to operate in 55 synchronism with the action of the cutting device 11 so as to complete the circuits through the magnets 63 and 64 for a brief interval during each revolution of the commutators at the exact instant 60 when an uncolored portion *h* of the web should be exactly opposite the openings as indicated in Fig. 5. So long as the 65 uncolored portions of the web register exactly with the photo-electric cell registry device 17, motor 42 remains in-

active and this is the normal condition of the corrective device.

To show a condition in which the differential device operates, reference is made to the explanatory showing in Fig. 6. In this case it is noted that an uncolored portion of the web is early in its arrival at the registry control and thus at the cutting knife and to correct this in the succeeding colored areas the printer roll must be advanced. In this case, the light passing through the opening 62 is obstructed by a colored portion *g* of the web while light passing through the opening 61 is intercepted only by an uncolored portion *h* of the web, the following colored portion not yet having reached the opening 61. Under these conditions the intensity of the light impinging on the photo-electric cell 53 will be greater than that impinging on the cell 54 and the current flow through magnet 63 will be correspondingly greater than that through the magnet 64. The armature 68 of relay 65 will be pulled to the left closing the circuit through magnet 69, which, in turn, will attract armature 71 and start motor 42 in the direction which will rotate ring gear 38 in a clockwise direction, thus retarding the printing plates relative to the web as previously described. As the resulting printed areas are retarded, the currently active differential through magnets 63 and 64 will be reduced gradually until the condition shown in Fig. 5 has been re-established, their power becomes substantially equal and armature 71 will resume its circuit breaking position opening the circuit 105 and thus stopping the motor.

Referring to the color feeding device 19, the pick-up roll 23 is mounted in the frame 21 on a pick-up roll shaft 72. This shaft is normally rotated from the printer shaft 30 through a chain and sprocket drive 73 and through a one-way clutch 74 operating to drive the shaft 72 in a counter clockwise direction. It is the intent to drive the pick-up roll at 110 relatively high speed, say, 300 r.p.m. Thus, under normal driving conditions, power is taken from the main drive shaft 27, through the main clutch 29, through the differential device 31, 120 through the chain and sprocket drive 73, through the one-way clutch 74 to the pick-up roll 23 and hence to the squeeze roll 24 which at this time is in bearing engagement with the color applying plates 43 and 44 on the printer roll 20. Means are provided for interrupting the power drive from the main shaft 27 and for this purpose the main clutch 29 is controlled by a hand lever 75. The 130

parts are so arranged that moving of the hand lever in one direction will shift the main clutch into its inactive, non-clutching position.

5 It has been found preferable to keep the pick-up roll 23 and squeeze roll 24 rotating during the period while the printer is inactive and for this purpose means are provided for moving the 10 squeeze roll into an inoperative position away from the printing plates simultaneously with the movement of the main clutch into its inoperative position and at the same time to drive the pick-up roll from another source of power 15 independently of the normal source of power originating in the machine 10 and acting through the main shaft 27. For the purpose of swinging squeeze roll 24 20 out of contact with plates 43 and 44, the frame 21 is rockably mounted to swing about the axis of the pick-up roll and its shaft 72. The pick-up roll 23 may also be driven from shaft 72 through pulley 25 76 loose on shaft 72 and driving the same through a one-way clutch 77. The pulley 76 is belted to a slow speed electric motor 78. Pressure roller 14 is mounted on bracket 93 and is normally 30 in position to press the web against the plates 43 and 44.

The frame 21 and brackets 93 are rocked to and from their position with the squeeze roll 24 engaging the printer 35 roll through control mechanism connected to the throw-out yoke 79 of the main clutch 29. This control mechanism includes a shaft 80, lever 81 and link 82 for rocking shaft 83 which, in turn, is 40 provided with an arm 84 and link 85 connected to an ear 86 forming a projection from the frame 21. Also secured to the shaft 83 is the movable element 87 of switch 88 connected through wiring 45 89 to close the circuit through motor 78. From this construction it will be seen that moving the hand lever 75 to disconnect the main clutch 29 will simultaneously swing the color feeding device 50 19 into an inoperative position and will at the same time close the circuit through the auxiliary motor 78 to cause it to become active and in this way maintain the pick-up and squeeze rolls 55 rotating even though the balance of the printer is inoperative for the time being.

In operation and assuming that the machine is initially set to have the component mechanism of the machine 60 10 and the cutter 11 operate in proper timed sequence, the paper web is drawn from the source of supply 12 by the machine 10, is passed through the printer 18 arranged to have the colored 65 areas located thereon, and is then sub-

jected to a drying step before the printed web reaches the cigarette making machine. This machine operates conventionally to insert the tobacco filler on the web, and to apply the usual adhesive thereto, in this case along the uncolored margin provided therefor. The wrapper is formed, the overlapped edges pasted together and the cigarette rod *m* formed as is usual in such devices, after which the rod is cut off by the cutting device 11 into the usual cigarette lengths *a* still following conventional practices in this respect.

It is suggested that an aniline dye be used as the coloring material as this is the most satisfactory material and has the advantage of being inexpensive. It can be thinned so that very little coloring matter is added to the paper, merely enough to give a uniform surface coloring, care being exercised not to wet the paper any more than is necessary. This slight wetting has the advantage of providing for a quick drying, preferably by a simple drying, and this has a further advantage in that it has no deleterious effect on the tensile strength and other characteristics of the paper web. It is also possible to change the colors used, simply by replacing one dye for another in the reservoir. Any incidental variation in the web due to the use of the different dyes and which may affect the timing of the arrival of the cutting lines *i* relative to the cutting device 11 is quickly and automatically adjusted by the electric eye form of differential control herein featured. The device therefore is entirely automatic in its operation and insures the proper locating of the colored areas *g* in the finished cigarette so that every cigarette is an exact duplicate of every other cigarette even though the printing operation in action for the time being may create momentary variations in the wetted web in the part thereof just before it reaches the cigarette making machine.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A machine for applying color to a web, comprising mechanism for drawing a length of web along a printing and drying path and for severing the same into preset lengths, a printer provided with a printer roll operatively engaging the web while in said path to apply color thereto along spaced apart areas, and means operatively controlled by variations in a prefixed spacing of the adjacent ends of the colored areas

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relative to said path at the instant of actuation of a severing device for rotatably adjusting the printer roll relative to the web to insure the timing of the 5 severing device to sever the web between succeeding colored areas.

2. A machine according to Claim 1, which includes a squeeze roll normally in operative engagement with the printer 10 roll to supply color thereto, control means for moving the color supply means to and from a position providing an operative engagement with the printer roll and to and from an idling position, and 15 means for rotating the squeeze roll.

3. A machine according to Claim 2, in which the control means comprises a main power drive including a control clutch normally operative for driving 20 the printer roll, a manually actuated control operatively connected with the clutch and color applying means for moving the color applying means into an inoperative position simultaneously with 25 the movement of the clutch into position to disconnect the squeeze roll from the main drive thereby to interrupt the operation of the squeeze roll and printer roll from the main power drive, and a 30 supplemental power drive for rotating the squeeze roll when disconnected from the main power drive.

4. A machine according to Claim 3, including a control mechanism operatively connected to cause the supplemental power drive to become operative when the squeeze roll has been moved out of engagement with the printing roll.

5. A machine according to any one of the 40 preceding claims, including a shiftable frame in which the squeeze and pick-up rolls are journaled, and in which the control means moves the frame to and from a position in which the squeeze roll 45 supplies color to the printer roll.

6. A machine according to any of the preceding claims, including interconnected driving means for rotating the printer roll and the squeeze roll at the 50 same peripheral speed.

7. A machine according to any of the preceding claims, including a driving connection between the printer roll and the severing device normally connected 55 to effect one printing operation to each severing operation.

8. A machine for applying color to a web, comprising means for drawing a web of paper from a source along a 60 treating path, cutting means beyond the treating path and timed for severing the wrappers into commercial lengths, said treating path having a printer including a printer roll located to apply longitudinally spaced apart areas of color to the 65

paper web while in said path, the portion of the web path between the printer and the cutting means being exposed for drying the web wetted by the printer, an electric eye form of control between the printer and the cutting means and operatively controlled by the colored areas on the web, said printer including a main power drive including a differential mechanism for rotating the printer roll relative to the web to relocate the colored areas on the web, a reversible motor for controlling the action of said differential mechanism to cause the printer roll to locate the colored area on the web in such spaced relation to the cutting means as will cause the cutting means to sever the wrappers across the uncolored bands between the colored areas, and power means normally operatively connected to drive the drawing means, the printer drive and the cutting means in unison.

9. A machine according to Claim 8, including mechanism for forming the printed web into a continuous rod of easily severable and wrapped material to be cut into commercial lengths by the cutting means, and in which the electric eye control acts to automatically locate the spaced apart areas of color on the web leaving uncolored bands therebetween across which the cutting means operates to cut off the commercial lengths from the rod irrespective of any incidental extensions or shrinkage of the web between the printer and the cutting means.

10. A machine according to Claim 9, in which the electric eye control acts to momentarily speed up or retard the action of the printer relative to the travel of the web past the same.

11. A machine according to any one of Claims 8 to 10, in which the electric eye control comprises two photo-electric cells, each having a rectangular opening facing the colored web and controlled by the colored and uncolored areas on the web as the web passes the control, the over-all space of said openings being equal to the length of the uncolored areas, means forming two relay circuits, each circuit including one of the photo-electric cells, a commutator driven in synchronism with the cutting means and operating to close the circuit in a timed sequence with the operation of the cutting means, and one of the magnets of a double acting relay and circuit closing means controlled by the armature of said relay for selectively actuating said motor and for controlling its direction of rotation whereby the preceding location of the colored areas on the web control the

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locating of the succeeding colored areas on the web.

12. A machine for applying color to a web, comprising mechanism for drawing a length of web along a printing and drying path and for severing the same into preset lengths, a printer including a printing roll for applying spaced apart areas of color to the web before it enters said mechanism, leaving uncolored bands between the colored areas, said roll having a peripheral speed substantially equal to that of the speed of the web engaging the same, adjusting means operatively connected to the printing roll for momentarily varying the peripheral speed of the printing roll relative to the speed of the web as it passes the same, and control means adjacent to and in advance of the cutting mechanism automatically controlled by the succeeding colored and uncolored areas of the web and operatively connected to said adjusting means to cause it to act on the printing roll for rotatively resetting the same in its relation to the web to cause the cutting mechanism to sever the web along succeeding severing lines located in the uncolored bands and in spaced relation to the adjacent ends of the colored areas.

13. A machine according to any of the preceding claims, in which the printer roll is loose on a main drive shaft and is provided on its periphery with at least

one printing plate having its ends circumferentially spaced apart leaving at least one recess in the periphery of the printer roll, and a spring pressed clutch forming a flexible driving connection between the shaft and the printer roll permitting a slipping of the shaft relative to the printer roll when its printing plate is in engagement with the web.

14. A machine according to Claim 13, in which the spring pressed clutch provides a slip driving connection between the shaft and the printer roll operating to permit a slight rotation of the shaft relative to the printer roll and acting to reset the normal driving relation between the shaft and the printer roller during the time the recess is opposite the web and thus when the printer plate is out of contact with the web.

15. The machine for applying color to a web substantially as hereinbefore described with reference to and illustrated in Figs. 1 to 6 of the accompanying drawings.

Dated this 31st day of January, 1945.

For: HARRY FRIEDWALD.

STEVENS, LANGNER,

PARRY & ROLLINSON.

Chartered Patent Agents,
5-9, Quality Court, Chancery Lane,
London, W.C.2.

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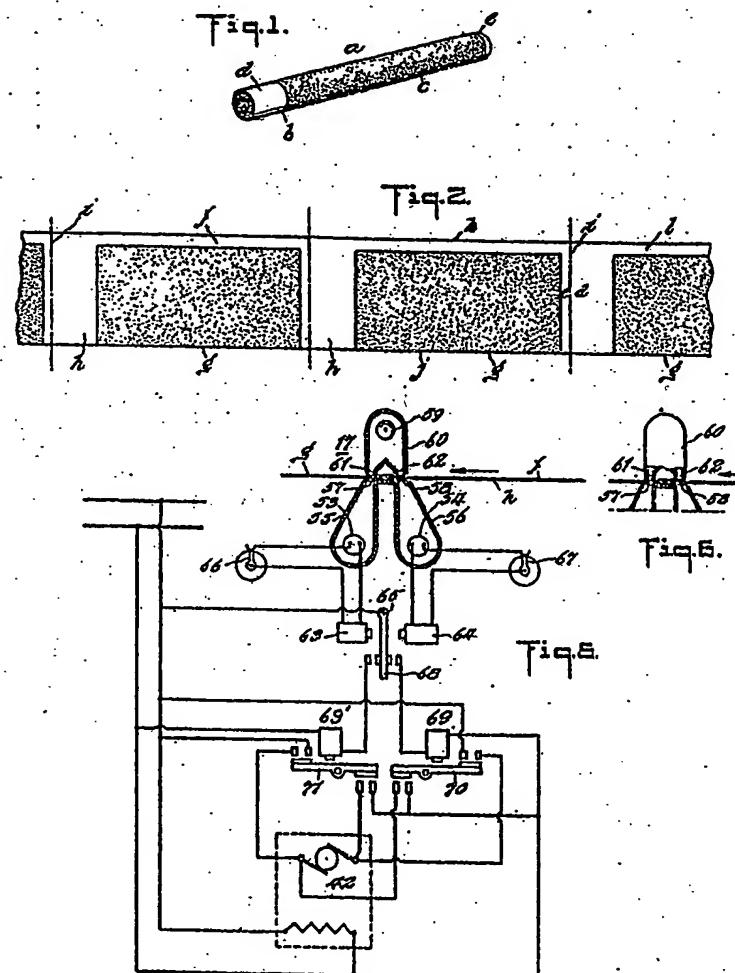
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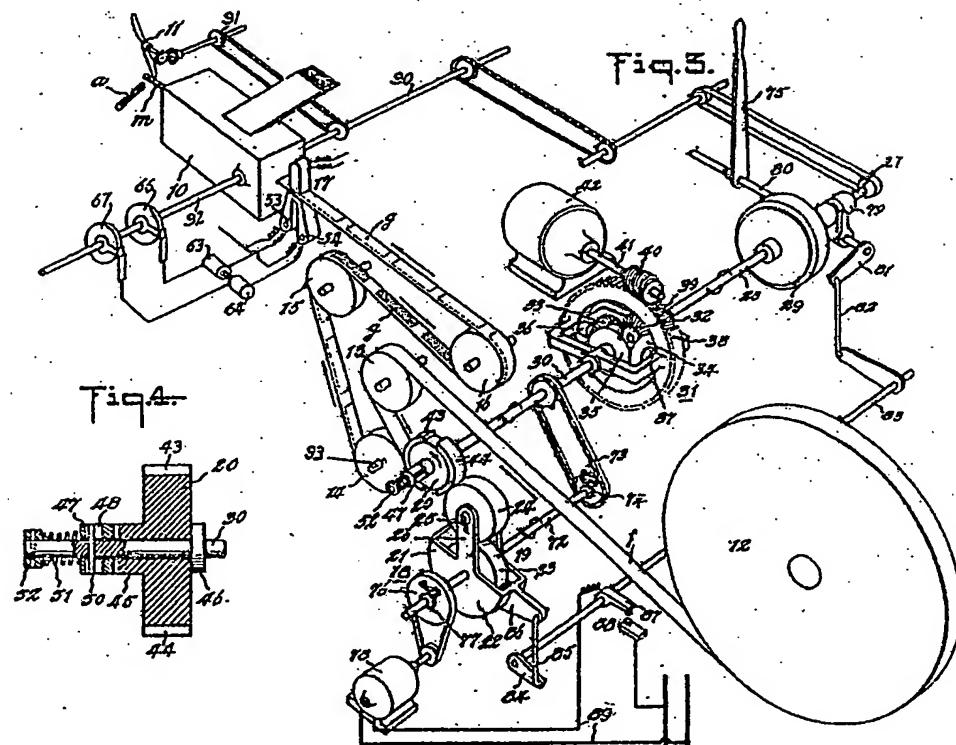
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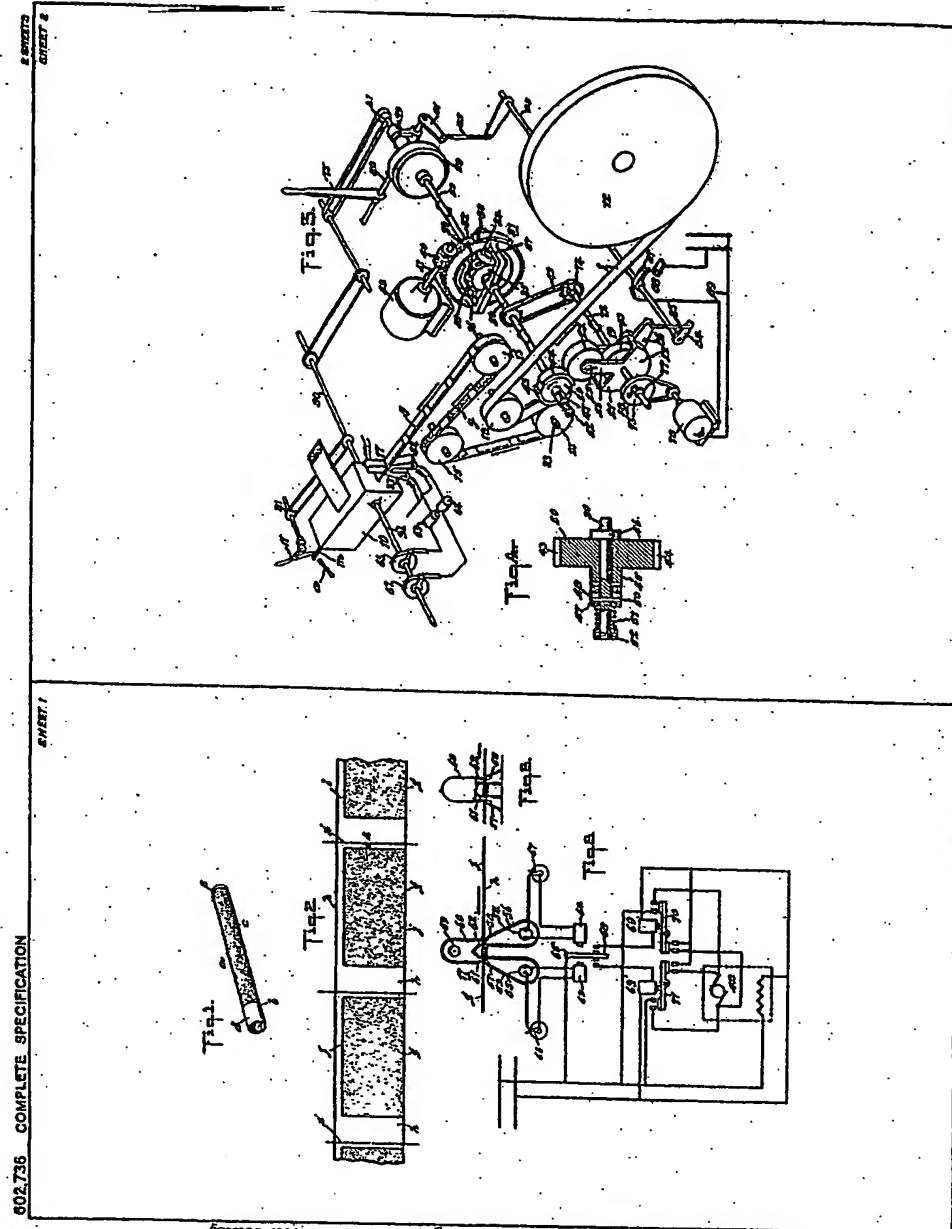
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